

Serial No. 10/533,910

Attorney Docket No. 24-023-TN

**REMARKS**

Claims 5, 6, 8, as amended, and 11-14 remain in this application for the Examiner's review and consideration. Claims 1-4, 7 and 9-10 were previously canceled from consideration with the present application without prejudice. The claims were amended to correct informalities. As these amendments do not introduce any new matter into the present application, their entry at this time is warranted. The applicants respectfully request reconsideration and allowance of this application in view of the above amendments and the following remarks.

Claims 5, 6, and 8 were objected to because of the formalities indicated on page 2 of the Office Action. It was asserted that the phrase "may contact" should be changed to "contacts". The applicants have accordingly amended claims 5, 6 and 8 as suggested by the Examiner. Therefore, the objection to claims 5, 6 and 8 has been overcome and should be withdrawn.

Claims 5 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP Publication No. 2002-129366A to Shimura et al. ("Shimura") in view of U.S. Patent No. 7,279,089 to Vercammen ("Vercammen") for the reasons given on pages 2 and 3 of the Office Action. It was asserted that Shimura teaches adding amine to water going to a boiler and that Vercammen teaches the use of choline as a corrosion inhibitor for metals. The applicants respectfully request that this rejection be withdrawn for the reasons previously presented and for the following reasons.

In the present invention as currently recited in claims 5 and 6, the quaternary ammonium compound is added to water which may contact the inside of a steam generating unit to efficiently prevent corrosion even when added in small quantities. By contrast, Shimura is directed to preventing corrosion in an idle boiler when the boiler is not in use for an extended period of time by completely filling the boiler with a combination of water and a counter active amine. Shimura is not directed to preventing corrosion during the actual use of the boiler, nor is

Serial No. 10/533,910

Attorney Docket No. 24-023-TN

Shimura directed to preventing corrosion that occurs in the air or head space in the boiler as the boiler is completely filled with the water and amine mixture. Moreover, Shimura does not discuss inhibiting the formation of hydrogen chloride within the boiler. Therefore, Shimura is directed to a completely different type of environment and situation from the steam generating unit of the present invention. Shimura is directed to just the type of ammonia and neutralizing amine systems of the prior art that the present invention is overcoming. There is no teaching or disclosure in Shimura that would suggest to one of ordinary skill in the art of the need or desire for the quaternary ammonium compounds of the present invention.

As taught in Vercammen, in the crude oil refinery process, several forms of corrosion are observed (col. 1 line 18) depending upon the NH<sub>4</sub>CL concentration, pH, temperature, and material used to make the equipment. The method of Shimura is related to the methods of preventing corrosion of the inside of an idle boiler. In contrast, Vercammen discloses use of choline in preventing corrosion in a crude oil atmospheric distillation unit. The corrosion environment of the inside of an idle boiler in the case of Shimura is absolutely different from the distillation unit of Vercammen. Vercammen suggests that typical areas for fouling and corrosion are feed-effluent exchangers from reactors and distillation columns, recycle gas compressors transporting hydrogen containing ammonium chloride to the reactor feedstock, stabilizers, reboilers and overhead sections (col. 2 lines 21-26). None of these suggest the same kind of corrosion environment that would be found inside the idle boiler of Shimura.

Given the distinctly different environments of Shimura and Vercammen, one of ordinary skill in the art would not look to combine the teachings of Vercammen into the idle boiler of Shimura as there is no suggestion of the need for the choline of Vercammen in the idle, completely filled boiler of Shimura. The amines of Shimura are sufficient for the idle boiler environment. Therefore, the broad teaching of choline to prevent corrosion of Vercammen would

Serial No. 10/533,910

Attorney Docket No. 24-023-TN

not lead one of ordinary skill in the art to have used choline in the boiler of Shimura as suggested by the Examiner, because one of ordinary skill in the art has no guidance, teaching or suggestion in Vercammen to have substituted choline for the amine in the feed water as taught by Shimura.

Even given the combination of Shimura and Vercammen, one of ordinary skill in the art would not have been able to simply substitute the choline of Vercammen into the boiler of Shimura as Vercammen lacks sufficient teaching as to the success of using choline in an environment such as the inside of an idle boiler. The broad disclosure of the use of choline to prevent corrosion over other amines in a crude oil atmospheric distillation unit would not have led one of ordinary skill in the art to have made such a simple substitution of choline into the idle boiler of Shimura. There is no teaching in Vercammen that choline is preferably to other amines across a wide variety of occurrences of variables such as NH<sub>4</sub>CL concentration, pH, temperature, or across a wide variety of machinery.

It was asserted that Shimura and Vercammen are analogous art because they are concerned with solving the problem of similar technical difficulty, namely the prevention of corrosion of metal surfaces by quenching of corrosive acids with amines (page 3 of Office Action). However, as discussed above, the corrosion environment in the teachings of Shimura and Vercammen are different and the broad teaching of choline use in Vercammen does not provide the one of ordinary skill in the art sufficient guidance as to the use of choline in the corrosion environment of the idle boiler of Shimura. Moreover, the present invention is directed to inhibiting the formation of hydrogen chloride rather than neutralizing, i.e., quenching, hydrogen chloride (specification at page 7, lines 7-13), and one of ordinary skill in the art looking to improve corrosion resistance through the inhibition of hydrogen chloride formation would not look to the disclosures of Shimura and Vercammen, which according to the Examiner are both directed to the quenching of corrosive acids with amines.

Serial No. 10/533,910

Attorney Docket No. 24-023-TN

Therefore, the present invention is not rendered obvious based on the combination of Shimura and Vercammen, and the applicants respectfully request that the rejection of claims 5 and 6 under 35 U.S.C. 103(a) be reconsidered and withdrawn.

Claims 8 and 11-14 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,965,785 to Braden *et al.* ("Braden") in view of Vercammen for the reasons given on pages 3-5 of the Office Action. It was asserted that Braden teaches a process of adding amines to a liquid that comes in contact with an atmospheric piperstill tower and that Vercammen teaches the use of choline. The applicants respectfully request that this rejection be withdrawn for the reasons previously presented and for the following reasons.

Claim 8 is directed to a method for preventing metal corrosion in an atmospheric distillation column for a petroleum refining process in which a quaternary ammonium compound is prepared and added to a fluid which contacts the inside of the distillation column such that the pH value at the top line of the column is 5.5-6.5. Claim 11 is directed to a method of inhibiting hydrogen chloride formation in a crude oil atmospheric distillation unit by preparing ( $\beta$ -hydroxyethyl) trimethylammonium hydroxide and adding it to the desalted crude oil in the crude oil atmospheric distillation unit. Claims 12-14 depend directly from claim 11. The combination of Braden and Vercammen fails to render the present invention as currently recited in claims 8 and 11 obvious as one of ordinary skill in the art would not be able to combine the teachings of Braden and Vercammen to obtain the methods of the present invention.

Braden is directed to inhibiting corrosion in systems of condensing hydrocarbons which contain water and chlorides and teaches inhibiting corrosion on the internal metallic surfaces of a condensing system (col. 18, line 26). Braden uses blends of amines, and according to Braden, the amine blend is custom matched to the condensation pattern (col. 10 lines 18-19). Moreover, the candidate formulation of amines will have to be revised and tested several times to determine

Serial No. 10/533,910

Attorney Docket No. 24-023-TN

the best formula (col. 10 lines 42-44). Braden also teaches that if the crude oil composition used in the machinery is changed, the amine blend formula must be changed to maintain optimal control (col. 10, lines 46-48). In Braden, an amine will be very effective in one sector of the condensation zone and less effective in another depending on its temperature versus its vapor/oil/water solubility partition characteristics (col. 10 lines 19-22). In addition, several properties and characteristics must be considered when selecting amines for the blend packages to be used (col. 9 lines 12-13). However, Braden states that there is still much of what goes on in the system that is not fully understood so that candidate amine blends must be tested (col. 10 lines 27-28).

Therefore, Braden is directed to the use of blends of the neutralizing amines of the prior art that are ordinarily used as pH controllers. There is no suggestion or teaching in Braden regarding the use of the quaternary ammonium compound or the ( $\beta$ -hydroxyethyl) trimethylammonium hydroxide of the present invention. In fact, Braden teaches away from the use of such compounds and instead focuses on the use of blends of the neutralizing amines. Therefore, one of ordinary skill in the art, given the disclosure of Braden, would not think to look to the disclosure of Vercammen for teachings regarding compounds that are not the amine blends of Braden.

Even given the combination of Braden and Vercammen, one of ordinary skill in the art would not be able to practice the present invention as recited in claims 8 and 11, because the choline of Vercammen can not be simply or easily substituted for the amine blends of Braden. As discussed above, Vercammen discloses a choline or a derivative as an additive for a crude oil refinery process. However, one of ordinary skill in the art would not be able to modify the process of Braden with the additive of Vercammen for several reasons. Braden discloses an amine blend that is custom matched to the condensation pattern in the atmospheric pipestill

Serial No. 10/533,910

Attorney Docket No. 24-023-TN

tower based on a variety of factors. In addition, Braden discloses specific purposes and advantages of using a particular amine blend. Vercammen discloses a single additive and not a blend. The additive of Vercammen is not analogous to the blends of Braden, and there is no teaching as to how the single additive of Vercammen can be simply substituted for the custom matched amine blend of Braden. Braden actually teaches away from the use of a single additive, as the single additive is not as likely to achieve the targeted benefits of the custom amine blend of Braden. Therefore, one of ordinary skill in the art would not have substituted the single additive of Vercammen for the custom amine blend of Braden, because the advantages obtained by using a customized amine blend would have been lost.

The quaternary ammonium compound and the ( $\beta$ -hydroxyethyl) trimethylammonium hydroxide of the present invention when added to fluid or desalted crude oil can efficiently prevent corrosion even when added in small quantities. This advantageous result of the methods of the present invention is absent in the disclosures of Braden and Vercammen. As illustrated in Table 5 of the specification of the present invention, neither monoethanolamine nor dimethylethanolamine exhibited any hydrogen chloride formation inhibiting effect or hydrogen chloride neutralizing effect. Therefore, not all amines can exhibit a corrosion inhibiting effect in the crude oil atmospheric distillation unit. Therefore, one of ordinary skill in the art would not have found it a matter of simple substitution to use a quaternary ammonium compound instead of the amines (sec-butylamine, 2-amino-1-methoxypropane, 3-amino-1-methoxypropane) of Braden.

Because one of ordinary skill in the art would not have been motivated to combine the teachings of Braden and Vercammen and even given the combination of Braden and Vercammen would not have been motivated to substitute the choline of Vercammen for the amine blends of Braden since this would result in the loss of a critical invention feature of Braden, namely the formulation of a custom matched amine blend, claims 8 and 11-14 are not rendered obvious by

Serial No. 10/533,910

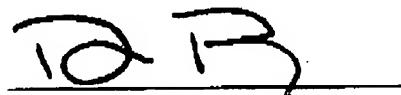
Attorney Docket No. 24-023-TN

the combination of Braden and Vercammen. Therefore, the applicants respectfully request that the rejections of claims 8 and 11-14 under 35 U.S.C. 103(a) be reconsidered and withdrawn.

In view of the foregoing, the applicants submit that this application is in condition for allowance. A timely notice to that effect is respectfully requested. If questions relating to patentability remain, the examiner is invited to contact the undersigned by telephone.

If there are any problems with the payment of fees, please charge any underpayments and credit any overpayments to Deposit Account No. 50-1147.

Respectfully submitted,

  
\_\_\_\_\_  
David G. Posz  
Reg. No. 37,701

Posz Law Group, PLC  
12040 South Lakes Drive, Suite 101  
Reston, VA 20191  
Phone 703-707-9110  
Customer No. 23400